Number One Air Conditioning Maker

Carrier

Division of Carrier Corporation

Carrier Parkway • Syracuse, N.Y. 13221

Installation, Start-Up and Service Instructions

38QF
→ 018-060

Heat Pump — Outdoor Section

CONTENTS

SAFETY CONSIDERATIONS

Installation and servicing of air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service air conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available for all brazing operations.

WARNING: Before performing service or maintenance operations on system, turn off main power switches to indoor unit and outdoor unit. Turn off accessory heater power switch if applicable. Electrical shock could cause personal injury.

INSTALLATION

Step 1 — Check Equipment and Jobsite

UNPACK UNIT — Move to final location. Lift carton off, taking special care not to damage service valves or grilles.

INSPECT EQUIPMENT — File claim with shipping company if shipment is damaged or incomplete.

COMPLETE OR CONSIDER SYSTEM REQUIREMENTS before installing the 38QF.

Consult local building codes and National Electrical Code (NEC) for special installation requirements.

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping and servicing. Position so water or ice from roof cannot drop directly on top of unit.

Make provisions for condensate drainage and defrost water disposal whether unit is installed on ground or roof. (Ensure unit basepan drainage holes are not blocked.) See Step 2 for details. Roof installation method for 38QF depends on building construction and special requirements of local codes. Be sure that roof can support unit weight.

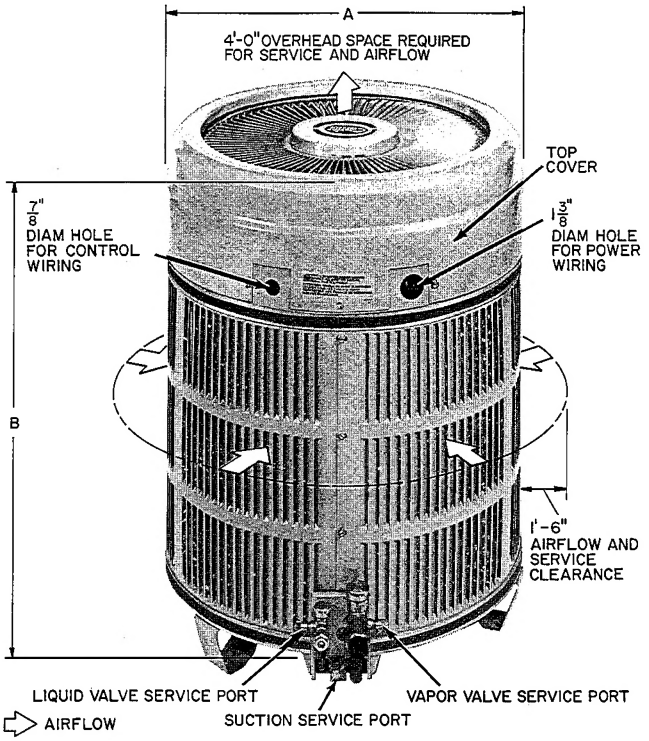
It is recommended that 38QF units be used with Carrier approved indoor sections; see Table 1.

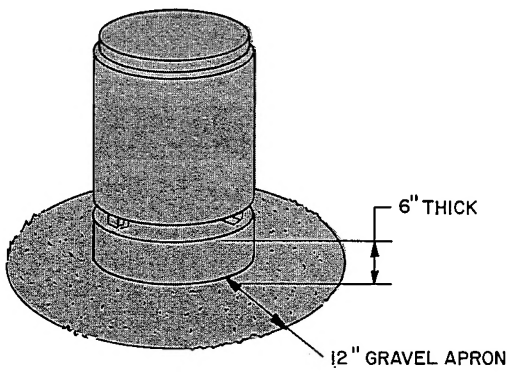
System Refrigerant Control on 38QF units and matching Carrier indoor units is a factory-installed AccuRater™ device (bypass type). Bypass-type AccuRater components are discussed in the service section of this booklet. The AccuRater piston has a refrigerant metering hole thru it and is field replaceable. Table 1 indicates indoor units for which the required replacement piston is factory supplied with specified 38QF outdoor unit. Replace piston as described under AccuRater™ Servicing on page 13.

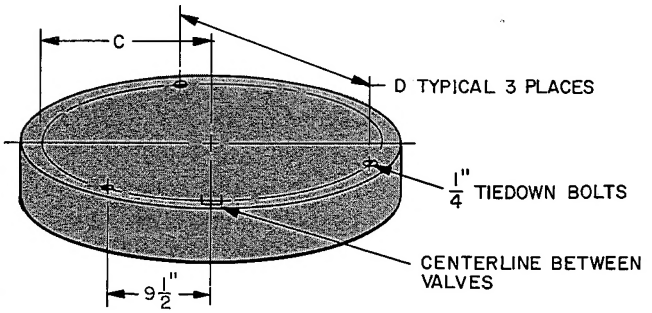
Top Cover Removal — Top cover can be removed for wiring or servicing heat pump. Loosen decorative strip and slide down off screw heads. Remove 3 screws in connector plate and 2 screws on front of unit. Loosen remaining 4 screws. Lift top from unit (see Fig. 1).

Step 2 — Mount Outdoor Heat Pump

ON THE GROUND: MOUNT UNIT ON A SOLID, LEVEL CONCRETE PAD (see Fig. 1).







CONCRETE MOUNTING PAD

→ **Fig. 1 — Dimensions, Connections and Mounting Pad (Refer to Table 2)**

Swing 3 legs down and lock in position, except when using accessory rack. Use accessory heat pump rack (Fig. 2) in areas where prolonged subfreezing temperatures or heavy snow occur. (Refer to installation instructions included with rack.) Drainage holes in unit base must not be obstructed.

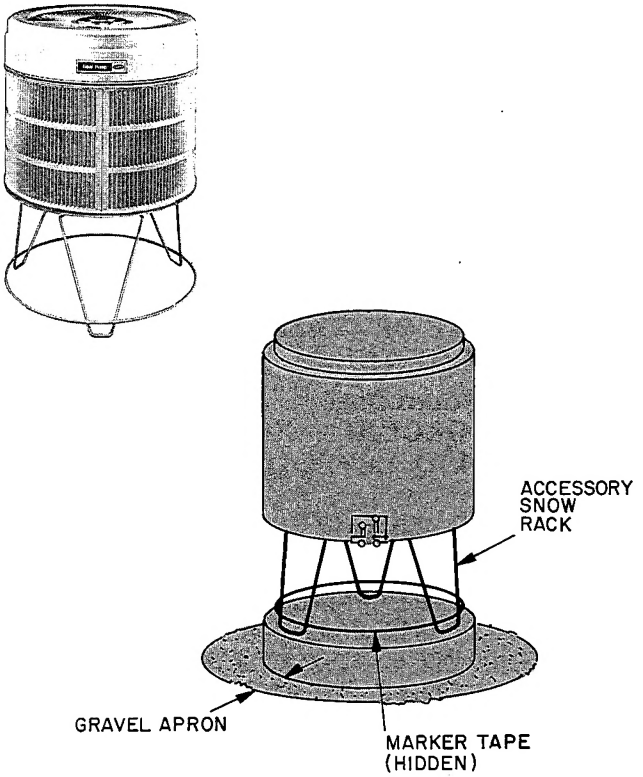


Fig. 2 — Accessory Mounting Rack

→ **Table 1 — Carrier Approved 38QF Systems**

OUTDOOR UNIT 38QF	REQUIRED OUTDOOR PISTON SIZE	INDOOR UNIT MODEL & SIZE	REQUIRED INDOOR PISTON SIZE
018	42	40AQ018 28HQ/VQ018 40AQ024 28HQ/VQ024 40FS075,28HQ/VQ042	52 52 55* 55* 61
024	46	40AQ024 28HQ/VQ024 40AQ030 28HQ/VQ030 40FS075,28HQ/VQ042	59 59 61* 61* 65
030	59	40AQ030 28HQ/VQ030 40DQ030 40AQ036 28HQ/VQ036	67 67 67 70* 70*
036	61	40AQ036 28HQ/VQ036 40QB/QH042 28HQ/VQ042	70 70 73* 73*
042	63	40QB/QH042 28HQ/VQ048 40QB/QH048	76 78 78
048	76	40QB/QH048 28HQ/VQ048 40QB/QH060 40QB/QH062 28HQ/VQ060	84 84 86* 86* 86*
060	82	40QB/QH060 40QB/QH062	96

*Factory-supplied piston packages shipped in outdoor unit. Replace remaining indoor pistons with size indicated.

ON THE ROOF: MOUNT UNIT ON A LEVEL PLATFORM OR FRAME: Proper precaution must be taken for support of unit in roof design. Elevate unit for proper clearance as described under ground installation above. Plan roof design and water drainage to prevent unit from setting in water. Flash all roof openings to prevent leaks.

Roof mounted unit exposed to winds above 5 mph may require protective wind baffles (field fabricated) to achieve adequate defrost.

Step 3 — Make Piping Connections — Heat pumps may be connected to indoor sections using Carrier accessory tubing package (Table 3) or field-supplied tubing of refrigerant grade, correct size and condition (Table 2). For requirements beyond 50 ft obtain information from local Carrier distributor.

→ Table 2 — Installation Data (Fig. 1)

UNIT 38QF	018	024	030	036	042	048	060
OPER WT (lb)	160	163	181	189	209	265	298
DIMEN (ft-in.)							
Diam (A)	2- 5 7/32					3-2 31/32	
Height (B)	2-2 15/32		2-8 3/32		3-1 3/4	2-8 7/16	3-2 1/16
Mtg Pad (Diam x Thick)*	2-6 x 0-6					3-3 x 0-6	
(C)	1-1					1-5 7/8	
(D)	1-10 1/2					2-7	
REFRIG CONN (in.)							
Suction (ODF)	3/4						
Liquid (ODF)	3/8						
REFRIG LINES (in.)							
Suction (ODF)	7/8					1 1/8†	
Liquid (ODF)	3/8						

*Mounting pad is field supplied.
†May use 7/8-in. accessory tubing package (slight capacity loss). See Table 3.

→ Table 3 — Accessories

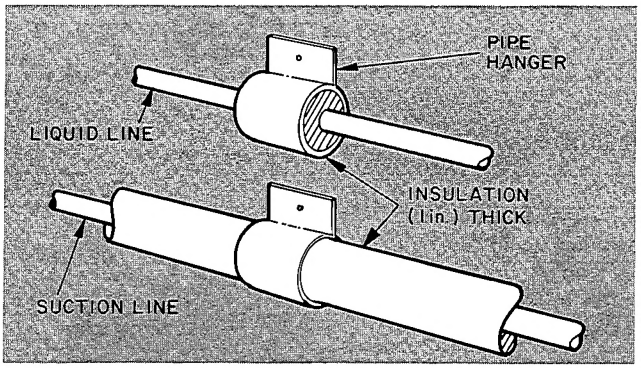
PART NO.	DESCRIPTION	MODEL 38QF
99TZ90040106	Low-Voltage Control — Honeywell Thermostat HH07AT171 and Thermostat Subbase HH93AZ173 — Automatic Changeover (Six 99TZ900401)	All
99TZ90041106	Low-Voltage Control — Honeywell Thermostat HH07AT171 and Thermostat Subbase HH93AZ175 — Manual Changeover (Six 99TZ900411)	
38QB90002106	Service Sentry — Standard on 38QF060 (Six HN65CT004)	018-048
28VQ900011	Twelve 3/4 x 1 1/8-in. connection adapters	030-060
38RQ90008106	Bi-Flow Heat Pump Filter Drier — Ref KH45LD077 (Six 38RQ900081)	All
HN61KL704	Supplemental Heat Relay — Required with 2 outdoor thermostats. (Six 38RQ900001)	
38QB90004106	Outdoor Thermostat (Six 38QB900041)	
38CQ900172	Optimizer Control Outdoor Thermostat — Ref HH22AG110 (Six 38CQ900161)	
38RQ90009106	Optimizer II Control Assembly — Use with HH22AG110 outdoor thermostat. (Six 38RQ900091)	
38QB90001106	Heat Pump Rack (Six)	018-042
38QF90000106	Heat Pump Rack (Six)	048,060
38QB90003106	Solid-State Time Guard II — 24 volt (Six 38QB900031)	
38QF90001106†	Liquid Line Solenoid (Six 38QF900011)	All
HC95DE088*	Start Capacitor	018
HC95DD121*	Start Capacitor	024
HC95DD121*	Start Capacitor	030
HC95DE070*	Start Capacitor	036,042
HN61KA054*	Start Relay	018
HN61HB515*	Start Relay	024
HN61HB510*	Start Relay	030
HN61HB505*	Start Relay	036
HN61HB504*	Start Relay	042
38EB660002*	Wire Bundle for Start Capacitor and Relay	All

TUBING PACKAGE	LENGTH	TUBING					MODEL 38QF
		Liquid		Suction‡			
		OD	Tube End OD	OD	Tube End OD		
					Evap	Cond	
	(ft)	(in.)	(in.)	(in.)	(in.)	(in.)	
38LS978151	15	3/8	3/8	7/8**	3/4	3/4	All
38LS978201	20	3/8	3/8	7/8**	3/4	3/4	
38LS978251	25	3/8	3/8	7/8**	3/4	3/4	
38LS978301	30	3/8	3/8	7/8**	3/4	3/4	
38LS978351	35	3/8	3/8	7/8**	3/4	3/4	
38LS978401	40	3/8	3/8	7/8**	3/4	3/4	
38LS978501	50	3/8	3/8	7/8**	3/4	3/4	

*Available thru Carrier Service Parts.
†Start capacitor and relay are required when using liquid line solenoid valve.
‡Suction line is insulated and has 90° bend.
**Capacity reduction may occur when 7/8-in. accessory tubing is used on 38QF042.

WARNING: If undersized, damaged or elliptically-shaped tubing is used when making Compatible Fitting, leaks may result.

If 1-1/8 in. tubing is used, braze it to the accessory 1-1/8 x 3/4-in. suction connection adapter (Carrier Part No. 28VQ900011) or to a correctly sized field-supplied adapter, then make Compatible Fitting connections. Isolate interconnecting tubing from framing and ductwork or where tubing runs thru stud spaces, enclosed ceilings or pipe chases. Use isolation type hangers, Fig. 3, since rigid fastening transmits pulsations to structure creating objectionable sound.



→ **Fig. 3 — Refrigerant Line Hangers**

→ CAUTION: DO NOT BURY MORE THAN 3 FT OF LINESET IN GROUND. If any section of lineset is buried, there must be 6-in. vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of unit shutdown, causing refrigerant slugging and possibly compressor damage at start-up.

A capacity reduction will result if accessory tubing is used in 38QF systems. For example, when a 25-ft 7/8-in. accessory package is used, there is a capacity reduction of 1-1/2 percent.

When other than 25 ft of interconnecting tubing is used, follow special requirements described in Refrigerant Charging. Do not use less than 10 ft of interconnecting tubing. Do not cut 7/8-in. suction line. Bend or coil to fit.

Do not use damaged or contaminated tubing. Always evacuate or purge evaporator coil and tubing system (use field-supplied refrigerant, not unit refrigerant).

When making tubing connections, be sure to provide clearance at unit for electrical connections.

REPLACE THE ACCURATER™ REFRIGERANT CONTROL PISTON IN THE INDOOR COIL AS REQUIRED before connecting refrigerant lines. See Table 1. Correct piston is supplied with 38QF unit. For piston replacement instructions, see AccuRater Servicing on page 13.

CONNECT REFRIGERANT LINES to fittings on unit suction and liquid service valves (Fig. 1). *Liquid service valve has flare fitting; suction service valve has Compatible Fitting.* Make suction line connection first. Slide flare nut on liquid line, then flare and connect liquid line. Use a maximum torque of 15 ft-lb to tighten flare nut. (Do not disassemble AccuRater.) Unit Compatible Fitting permits mechanical or sweat connection as described below.

When a 7/8-in. field-supplied suction line is used on 38QF, a field-supplied 3/4-in. to 7/8-in. suction line adapter must be provided (not required if 38LS accessory tubing is used).

When a 1-1/8 in. field-supplied suction line is used on 38QF, use accessory adapter 28VQ900011 or other field-supplied connection. Sweat connect refrigerant suction line to 1-1/8 in. end of adapter. Connect 3/4-in. end of adapter to unit suction line Compatible Fitting.

Mechanical Connection to Compatible Fitting (Mate one set of connections at a time.)

1. Loosen nut on Compatible Fitting one turn. Do not remove.
2. Remove plug and be sure O-ring is in the groove inside the Compatible Fitting.
3. Cut tubing to correct length.
4. Insert tube into Compatible Fitting until it bottoms.
5. Tighten nut until it bottoms on back coupler flange. Keep tube bottomed in Compatible Fitting while tightening nut.

Sweat Connection to Compatible Fitting (Use refrigerant grade tubing.)

1. Remove locking nut, rubber O-ring and Schrader core from valve.
2. Cut tubing to correct length.
3. Insert tube into Compatible Fitting. Wrap top and bottom of service valves in wet cloth to prevent damage by heat. Solder with low temperature (430 F) silver alloy solder.
4. Replace Schrader core.
5. Evacuate or purge system with field-supplied refrigerant.

Step 4 — Make Electrical Connections — Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be within permissible limits indicated on nameplate. Contact local power company for correction of improper line voltage.

WARNING: Operation of units on improper line voltage constitutes abuse and could affect Carrier warranty. See Table 4.

Do not apply units in system where voltage may fluctuate above or below permissible limits.

→ Table 4 — Electrical Data (60 Hz)

UNIT 38QF	V/PH	OPER VOLTAGE*		COMPR		FAN FLA	BRANCH CIRCUIT				
		Max	Min	LRA	RLA		Min Wire Size (AWG)†	Max Wire (ft)	Min Gnd Wire Size‡	Max Fuse or HACR Type Ckt Bkr Amps**	MCA
018	230/1	254	197	50	10.8	1.1	14	30	14	25	14.6
024	208-230/1			54	13.0		12	41	12	30	17.3
030				69	17.7		10	48	10	40	23.1
036				75	16.8		10	50	10	35	22.0
042				90	20.0		10	43	10	45	26.0
048	230/1	254	207	101	21.2	1.7	10	39	10	45	28.1
060				130	28.6		8	46	10	60	37.5

AWG — American Wire Gage
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
RLA — Rated Load Amps

*Permissible limits of the voltage range at which the unit will operate satisfactorily.
†Copper wire sizes based on 60 C. Use copper wire only.
‡Required when using nonmetallic conduit.
**Time-delay fuse

When making electrical connections, provide clearance at unit for refrigerant piping connections. See Table 4 for recommended wire and fuse sizes.

INSTALL A BRANCH CIRCUIT DISCONNECT PER NEC of adequate size to handle unit starting current. Provide a separate disconnect for outdoor unit, indoor unit and for each accessory electric heater circuit as required. (See Indoor Unit and Electric Heater Installation, Start-Up and Service Instructions.) Locate disconnect(s) within sight from and readily accessible from the unit; per section 440-14 of National Electrical Code (NEC).

ROUTE LINE POWER LEADS INTO UNIT — Extend leads from disconnect thru power wiring hole provided (see Fig. 1) and into unit splice area. Remove top cover to gain access to unit wiring.

CONNECT GROUND LEAD AND POWER WIRING — Connect ground lead to a ground lug in control box for safety. Then connect power wiring. See Fig. 4. Splice line power leads to yellow and black pigtails. Use wire nuts and tape at each connection. Connect unit wiring to copper wire only.

SEE INDOOR UNIT AND ELECTRIC HEATER INSTALLATION, START-UP AND SERVICE INSTRUCTIONS for line power wiring details. All control wiring is shown in this booklet.

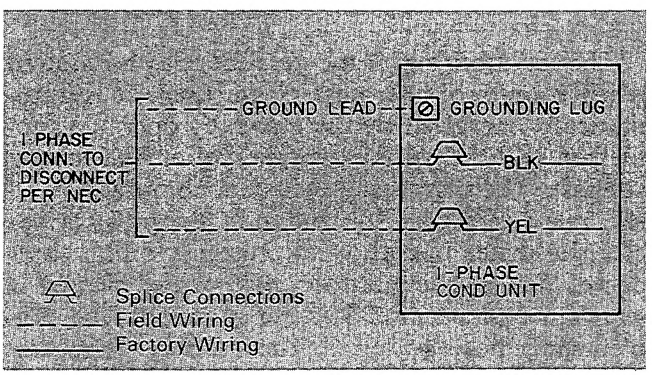


Fig. 4 — Line Power Connections

CONNECT CONTROL POWER WIRING (24 V) — Extend wiring thru hole provided (Fig. 1) and into low-voltage section of unit control ring. Connect leads to control wiring terminal board as shown in Fig. 5.

Use indoor unit transformer as 24-v supply for system. At least a 60-va transformer is recommended. Carrier approved indoor units are equipped with a 60-va transformer. See indoor unit data.

Use Carrier accessory indoor thermostat with subbase, Table 3.

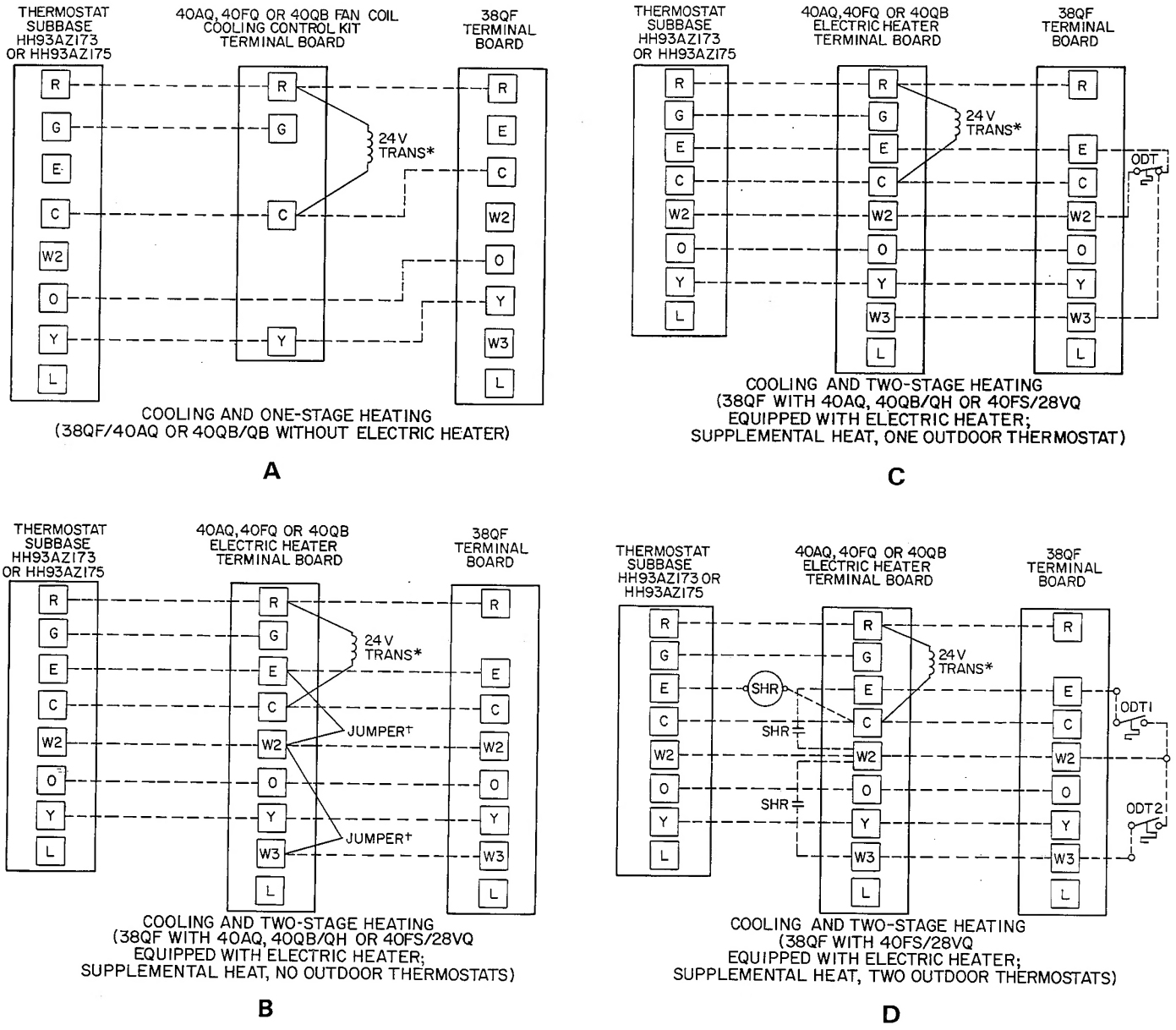
START-UP

The 38QF unit is equipped with a crankcase heater. It is recommended that heater be energized a minimum of 24 hours before starting unit. To energize heater only, turn the thermostat to OFF position and close electrical disconnect to heat pump.

Heat Anticipator Settings for Room Thermostat (HH07AT171) — Set anticipator settings for room thermostat according to Table 5. These settings may be changed slightly to provide a greater degree of comfort for a particular installation.

→ Table 5 — Thermostat Anticipator Settings

UNIT 38QF	FIRST-STAGE ANTICIPATOR SETTING	INDOOR UNIT WITH ELECTRIC HEATER	HTR KW	SECOND-STAGE ANTICIPATOR SETTINGS
018 024 030 036 042 048 060	Fixed	40AQ Fan Coil with 40AQ Htrs or 40QB/QH Fan Coil with 40QB Htrs	5.0 7.5 10.0	.25
			15.0 20.0 25.0	.50
			30.0 34.0	.75



SHR — Supplemental Heat Relay
ODT — Outdoor Thermostat
_____ Factory Wiring
_ _ _ _ Field Wiring

*Transformer (60 va) located in cooling control kit or electric heater.
†Remove factory-installed jumper (Connection B) when installing outdoor thermostats (ODT).

→**Fig. 5 — Control Circuit Connections**

Accessory Outdoor Thermostat provides adjustable outdoor control of accessory electric heater. This thermostat makes contact when a drop in outdoor temperature occurs. It energizes a stage of electric heat when the outdoor temperature setting is reached, provided the room thermostat is on the second stage of heating. One outdoor thermostat is recommended for each stage of electric heat after the first stage. Set the outdoor thermostat(s) progressively lower for each stage. Refer to heat load of building and unit capacity to determine the correct outdoor thermostat settings.

The accessory supplemental heat relay is required when 2 outdoor thermostats are used. It is automatically energized by the manually operated supplemental heat switch in the indoor thermostat subbase. The thermostat locks out compressor and the relay bypasses the outdoor thermostats for electric heater operation during heat pump shutdown. When one outdoor thermostat is used a supplemental heat relay is not required. The supplemental heat switch in the indoor thermostat subbase bypasses outdoor thermostat, locks out compressor and activates electric heater.

MOUNT OUTDOOR THERMOSTAT on control ring, to the left of the low-voltage control connection. See Fig. 1.

Attach brackets with short sheet metal screws to avoid contact with coil. Leave capillary tube coiled in control compartment making sure it is clear of all electrical connections and sharp metal edges.

MOUNT SUPPLEMENTAL HEAT RELAY in convenient location on indoor unit. Attach with sheet metal screw.

To Start Unit — (Make sure crankcase heater has been energized for 24 hours.) Adjust the thermostat as follows:

1. Set selector switch at OFF.
2. Turn on main disconnect switch(es) to indoor and outdoor units.
3. Set fan switch as desired (ON or AUTO.).
4. Set thermostat dial at desired temperature.
5. Set selector switch at HEAT or COOL.

Check system refrigerant charge. See Refrigerant Charging.

SERVICE

CAUTION: Unit has high-pressure piping which may also be hot to touch, energized electrical components and a rotating fan. Before servicing or checking unit, be sure *all* system power is off and tubing is cool.

CAUTION: To prevent personal injury, wear safety glasses and gloves when handling refrigerant.

Do not overcharge system. An overcharge can cause compressor flooding.

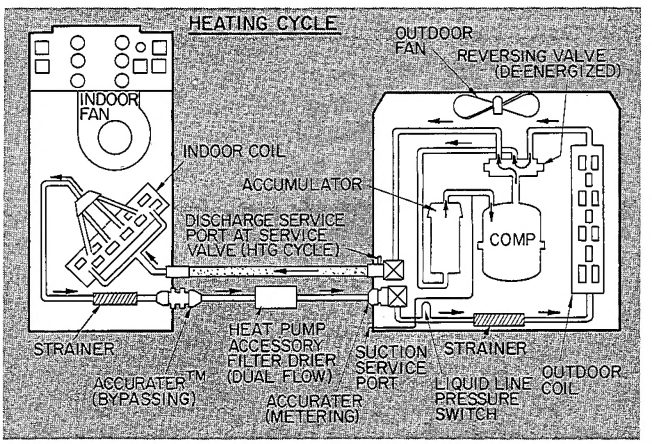
Refrigerant Charging — The 38QF units contain correct operating charge for complete system when connected to 28VQ, 40QB/QH or 40AQ indoor units with 25 ft of tubing of recommended diameter. Charge adjustment is required on other systems. Adjust system charge for refrigerant line lengths and diameters that differ from 25 ft and 3/8 in. OD (liquid line), respectively, using refrigerant weights below. Twenty-five ft 3/8-in. OD tubing contains 14.4 oz of R-22. Add R-22 charge to system if liquid line is over 25 ft; remove charge if liquid line is shorter than 25 feet.

LIQUID LINE DIAM (in.)	OUNCES OF R-22/FT LENGTH OF LIQUID LINE
3/8	.58

When recharging is necessary during heating or cooling season, weigh in total charge indicated in Table 6. (Charge must be weighed in during heating season.) Remove any refrigerant remaining in system before recharging. If system has lost complete charge, triple-evacuate system to 5000 microns (29.7 in. vacuum) before recharging. Service port connections are provided on liquid and suction line service valves for evacuation and charging (See Fig. 6 for correct service port location on cooling and heating cycles.) Dial-a-charge charging cylinder is an accurate device used to recharge systems by weight. These cylinders are available at refrigeration supply firms.

Table 6 — Service Data

UNIT 38QF	018	024	030	036	042	048	060
R-22 CHARGE (lb)	5.7	6.1	6.7	7.4	8.7	9.3	9.8
REFRIG CONTROL	AccuRater™ (Bypass Type)						
FAN							
Cfm	2400		2750			4500	
Rpm	840						
Diam (in.)	20					26	



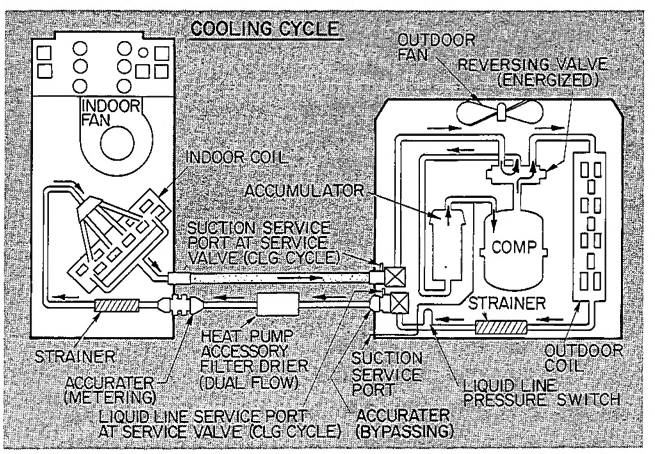


Fig. 6 — 38QF Refrigerant Flow Diagrams

To check and/or adjust charging during cooling season, use correct Cooling Cycle Charging Chart (Fig. 7, 9, 11, 13, 15, 17, 19) and follow Charging Chart Method below. The charging chart may also be used as an alternate method of recharging system.

To check *system operation* during heating cycle, use correct Heating Cycle Operation Check Chart (Fig. 8, 10, 12, 14, 16, 18, 20). These charts indicate whether a correct relationship exists between system operating pressures and air temperatures entering indoor and outdoor units. If pressure and temperature lines do not intersect on chart, the system refrigerant charge may not be correct or other system abnormalities may exist. Do not use Operation Check Charts to adjust refrigerant charge. Weigh charge into system.

COOLING CYCLE CHARGING CHART METHOD

1. Operate unit a minimum of 10 minutes before checking charge, and after each charge adjustment.
2. Measure suction pressure by attaching a gage to outdoor unit suction service port. (See Fig. 6 for correct service port location on cooling cycle.)
3. Measure outdoor (coil inlet) air dry-bulb temperature with service thermometer.
4. Using a sling psychrometer, measure wet-bulb temperature of air entering indoor unit.
5. Refer to correct Charging Chart. Locate on curves where outdoor air dry-bulb and indoor air wet-bulb temperature lines intersect.
6. From intersect point, project vertically downward to chart suction pressure line. Compare chart suction pressure to unit suction pressure (Step 2).
7. If unit suction pressure is lower than chart pressure, add refrigerant to system until chart pressure is reached. If unit suction pressure is higher than chart pressure, remove refrigerant until chart pressure is reached.

Unit Single-Phase Compressors

COMPRESSORS OF THE SPLIT CAPACITOR (PSC) TYPE require an equalized system pressure to start. When supply voltage is within nameplate limit and compressor does not start, give compressor a temporary capacitance boost. See Carrier Standard Service Techniques Manual, Chapter 2, for details.

WARNING: Capacitance boost or installation of start capacitor and start relay should be performed by trained personnel. Improper procedure could cause personal injury or equipment damage.

→ CHARGING AND PRESSURE CHECK CHARTS

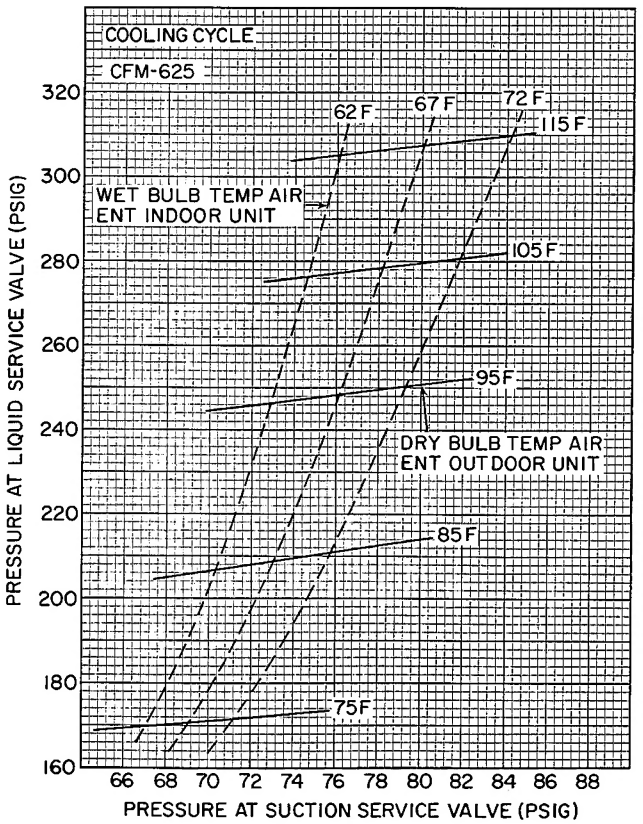


Fig. 7 — 38QF018 with 40AQ018,024, 28HQ,VQ018 or 024, 40FS075 with 28HQ,VQ042 Cooling Cycle Charging Chart

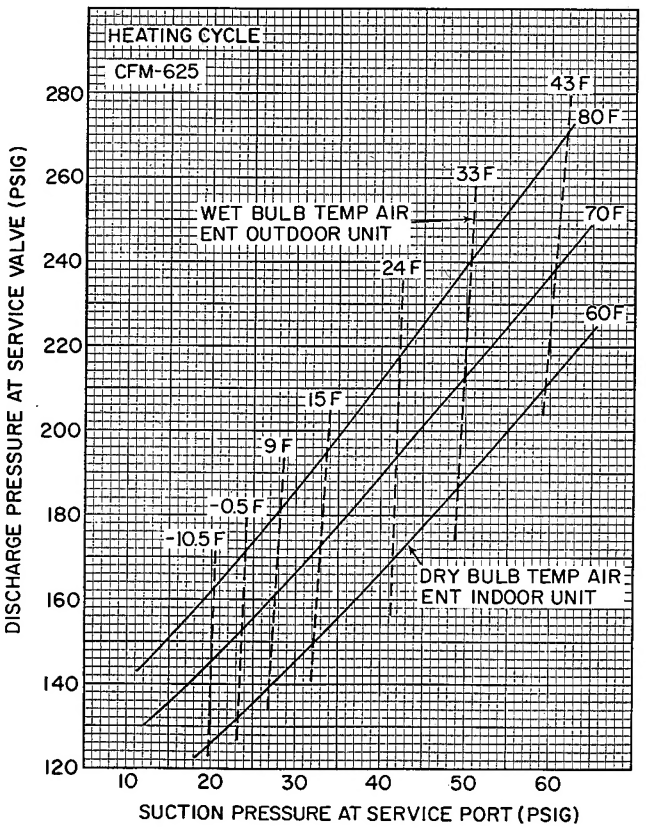


Fig. 8 — 38QF018 with 40AQ018,024, 28HQ,VQ018 or 024, 40FS075 with 28HQ, VQ042 Heating Cycle Operation Check Chart

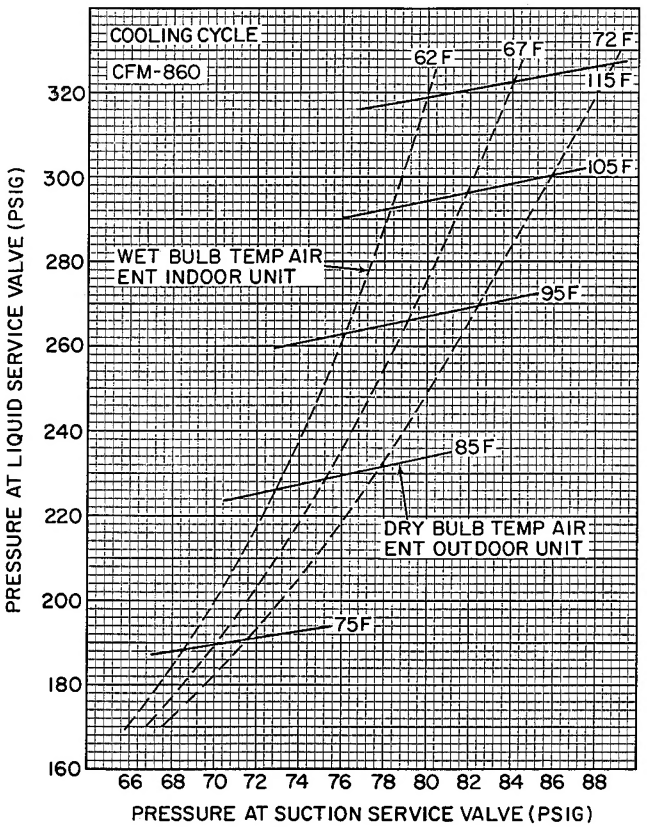


Fig. 9 — 38QF024 with 40AQ024,030, 28HQ,VQ024 or 030, 40FS075 with 28HQ,VQ042 Cooling Cycle Charging Chart

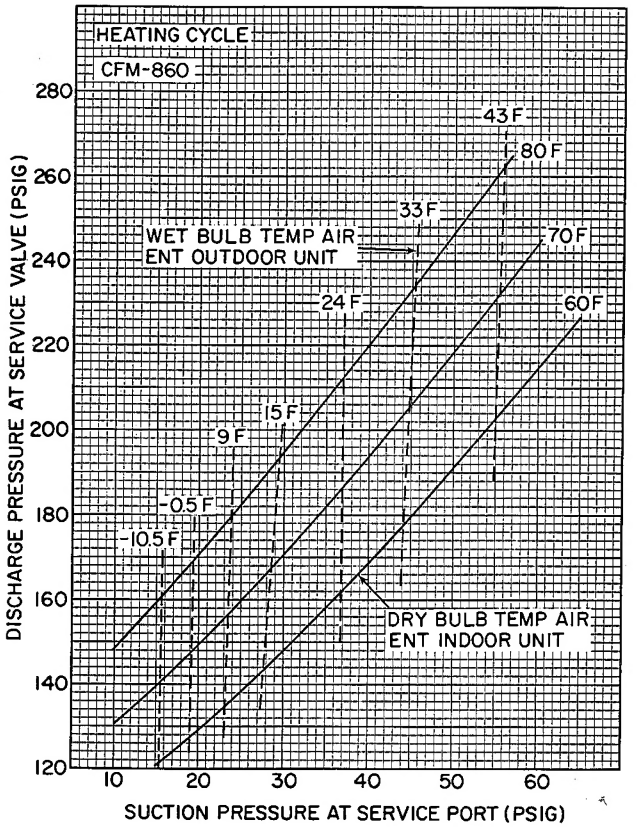


Fig. 10 — 38QF024 with 40AQ024,030, 28HQ,VQ024 or 030, 40FS075 with 28HQ, VQ042 Heating Cycle Operation Check Chart

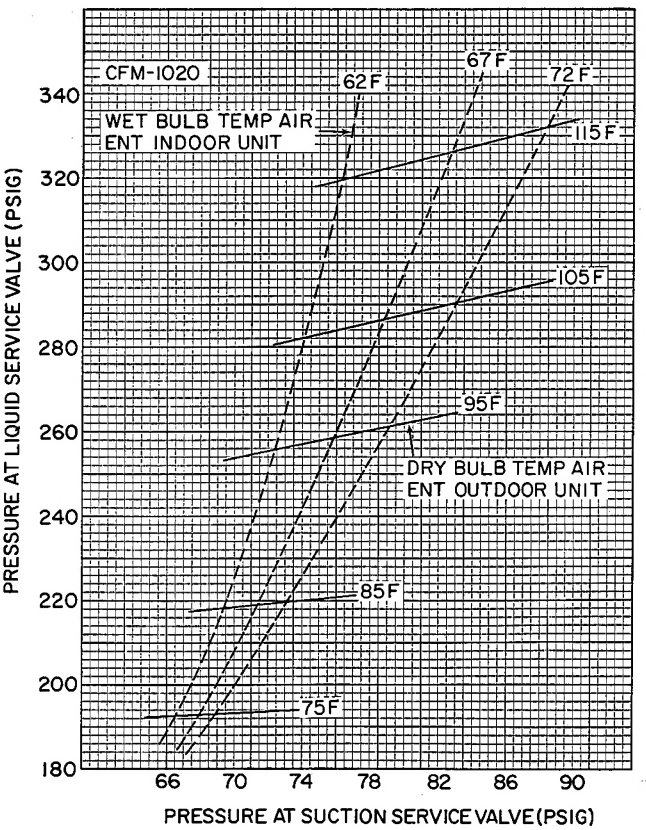


Fig. 11 — 38QF030 with 28AR036, 28HQ,VQ036 or 40AQ036, 40DQ030 Cooling Cycle Charging Chart

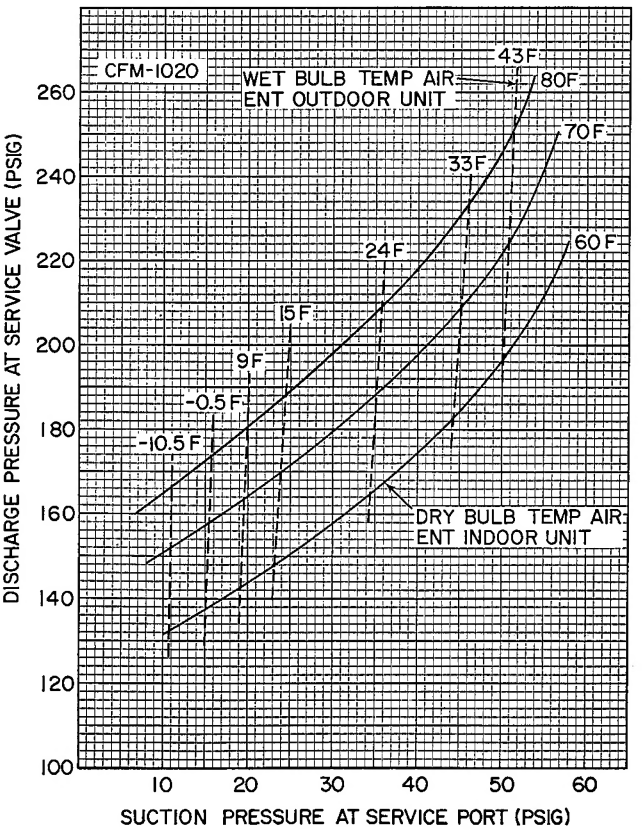


Fig. 12 — 38QF030 with 28AR036, 28HQ,VQ036 or 40AQ036, 40DQ030 Heating Cycle Operation Check Chart

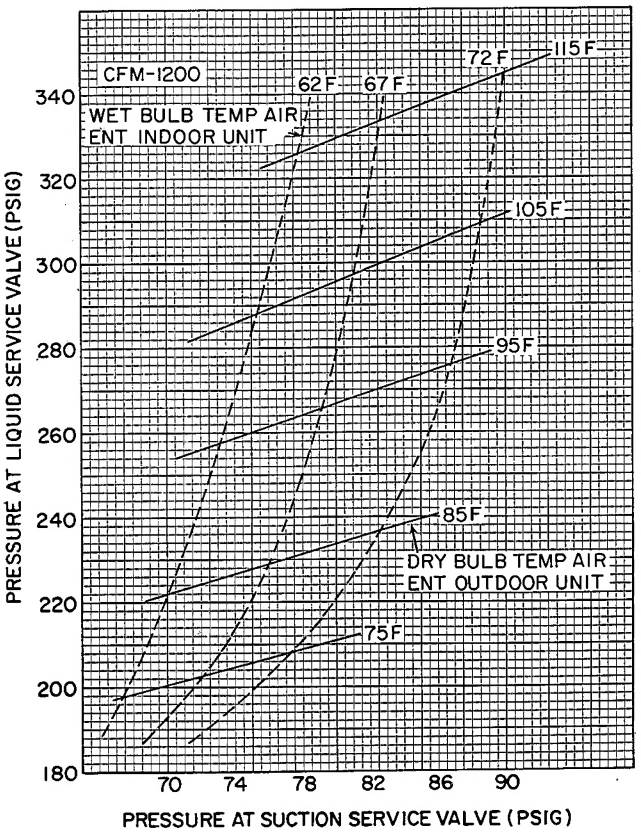


Fig 13 — 38QF036 with 28HQ,VQ042, 40AQ036 or 40QB/QH042 Cooling Cycle Charging Chart

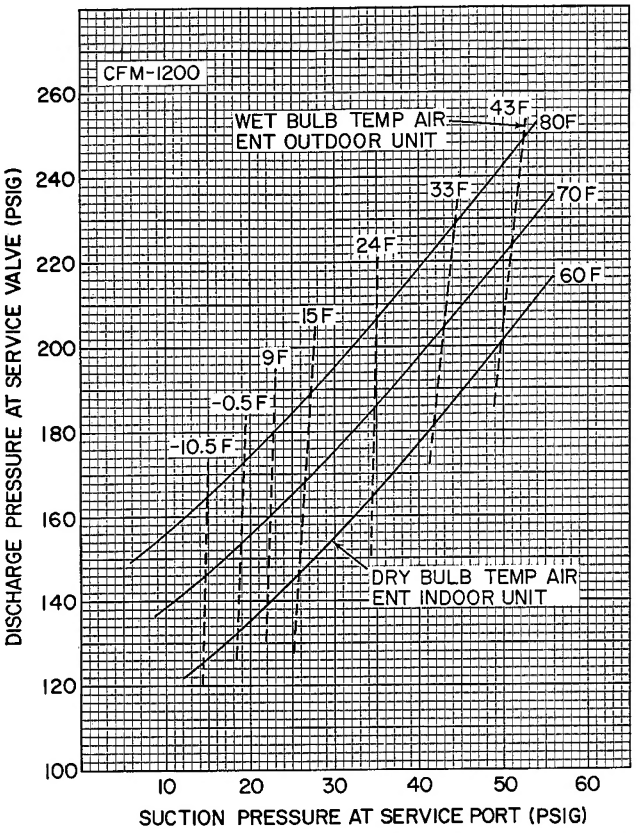


Fig. 14 — 38QF036 with 28HQ,VQ042, 40AQ036 or 40QB/QH042 Heating Cycle Operation Check Chart

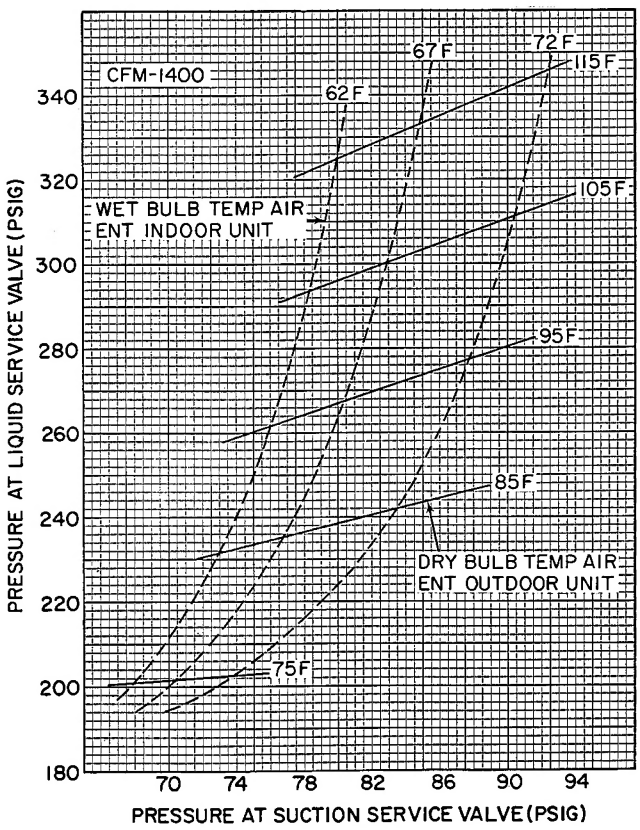


Fig. 15 — 38QF042 with 28HQ,VQ048, or 40QB/QH042,048 Cooling Cycle Charging Chart

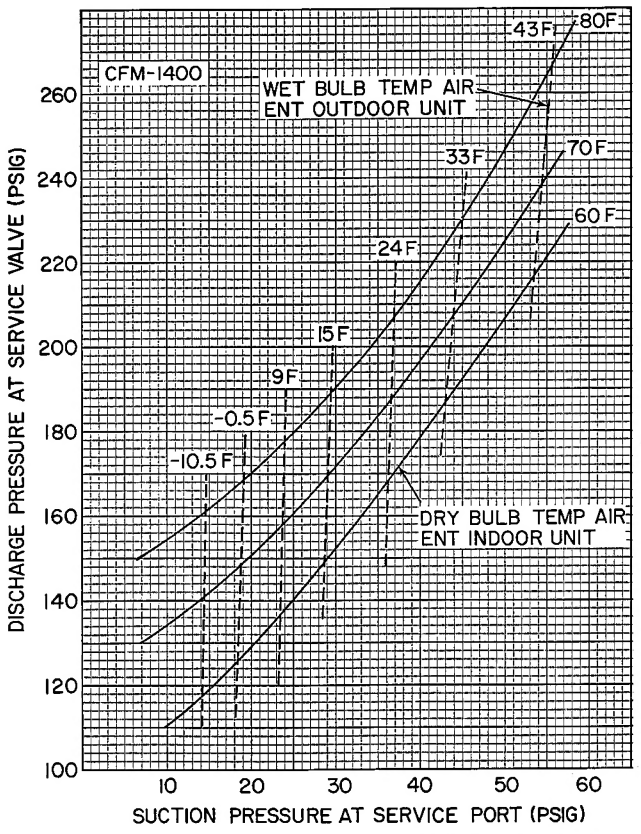


Fig. 16 — 38QF042 with 28HQ,VQ048, or 40QB/QH042,048 Heating Cycle Operation Check Chart

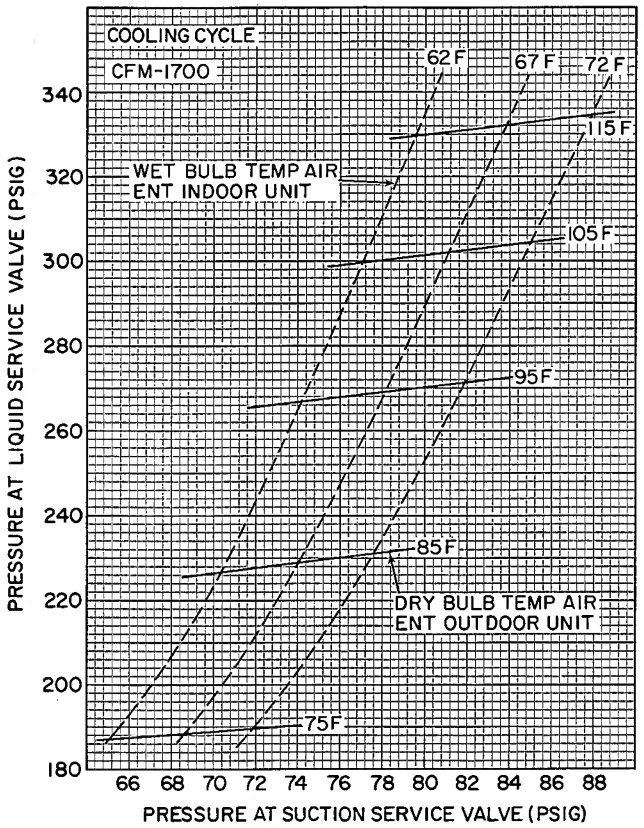


Fig. 17 — 38QF048 with 40QB/QH048,060,062, 28HQ,VQ048 or 060 Cooling Cycle Charging Chart

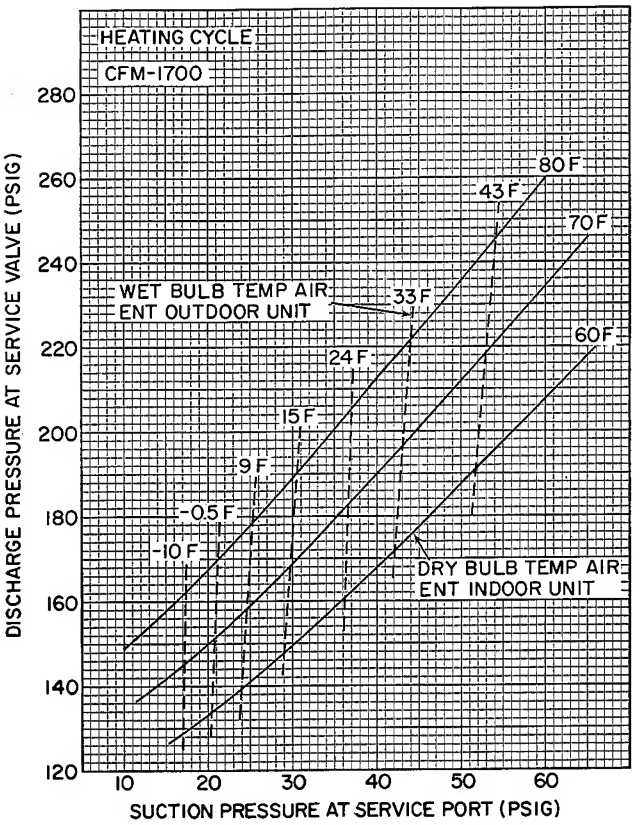


Fig. 18 — 38QF048 with 40QB/QH048,060,062, 28HQ,VQ048 or 060 Heating Cycle Operation Check Chart

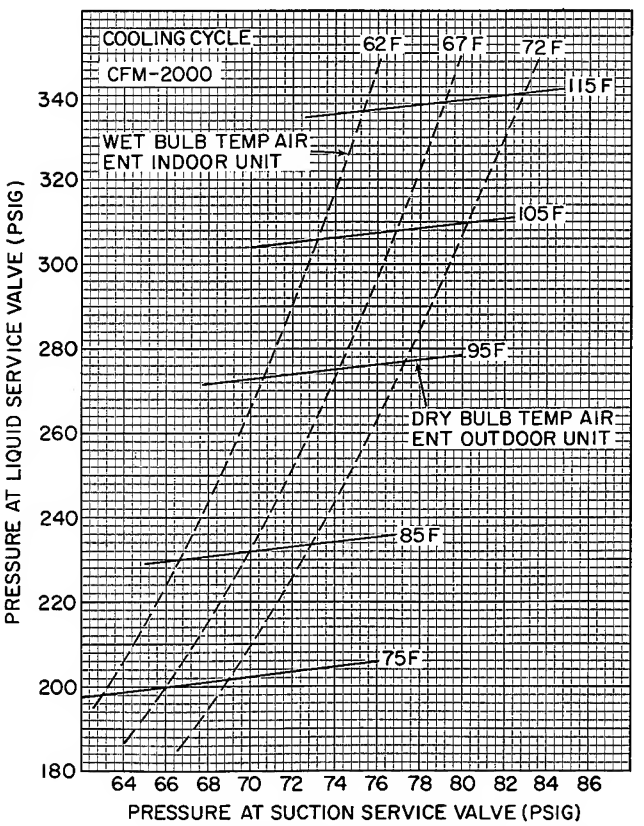


Fig. 19 — 38QF060 with 40QB/QH060,062 Cooling Cycle Charging Chart

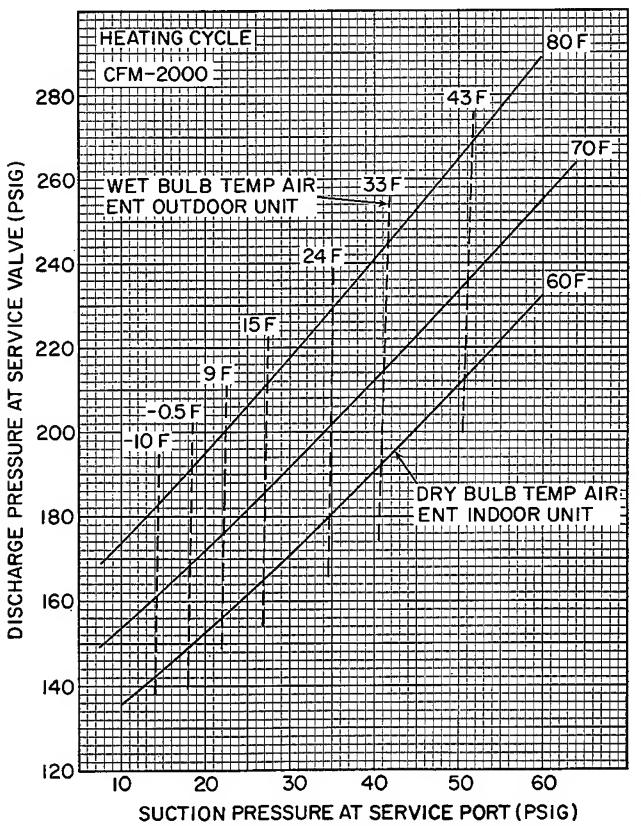


Fig. 20 — 38QB060 with 40QB/QH060,062 Heating Cycle Operation Check Chart

Compressor Removal — See Table 7 for compressor information and Fig. 21 for component location. Shut off power to unit. Remove refrigerant from unit using refrigerant removal methods described in Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants.

Be sure system pressure is 0 psig before proceeding.

→ Table 7 — Compressor Data (60 Hz)

UNIT 38QF	V/PH	PRODUCTION COMPRESSOR	
		Model*	Oil Recharge Ounces
018	230/1	H22B173ABCA	37
024	208-230/1	CRC2-0175-PFV	51
030	208-230/1	CRF1-0250-PFV	51
036	208-230/1	CRG1-0251-PFV	51
042	208-230/1	CRJ1-0301-PFV	51
048	230/1	PC4616CD	66
060	230/1	PC6016BD	66

*Refer to Carrier Service Parts Catalog for replacement compressor model numbers.

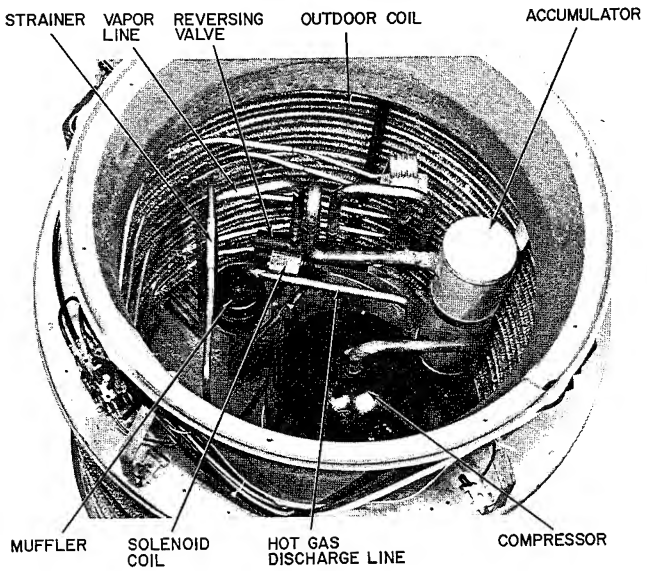


Fig. 21 — Component Location

Follow safety codes. Wear safety glasses and work gloves. Have quenching cloth available.

CAUTION: Aluminum tubing is used in unit coils. Do not overheat or place excessive strain on tubing or damge may result.

1. Remove top cover as described in Installation, Step 1.
2. Disconnect high- and low-voltage field wiring and fan motor leads from capacitor and contactor.
3. Remove screws holding discharge grille in place. Lift grille from unit.
4. Disconnect compressor leads (crankcase heater, low-pressure switch, defrost thermostat and solenoid coil) from electrical components and pull them thru the wire access opening into the coil section. Lift fan orifice/control ring after pinching and pressing down on 3 plastic pins of tube supports.
5. Remove louvered casing by taking out screws securing it to the cabinet and sliding it away from the coil.
6. Using a midget tubing cutter, cut liquid and discharge lines on the coil and suction and discharge lines at a convenient place near the compressor for easy reassembly with copper slip couplings.

CAUTION: Excessive movement of copper lines at compressor may cause a break where lines connect to condenser coil.

7. After plugging connections, remove condenser coil by pinching plastic pins of tube supports that extend into basepan and lift vertically. Set coil on a clean, flat surface.
8. Remove compressor holddown bolts and slide out compressor. Remove crankcase heater.

WARNING: For brazing and unbrazing have fire extinguisher and/or quenching cloth available in case oil vapor ignites.

9. Carefully unbraze suction and discharge line piping stubs from compressor after noting position of stubs to assist when reinstalling.
10. Install new compressor, placing crankcase heater around compressor. Be sure compressor holddown bolts are in place.
11. Replace coil; braze suction and discharge lines to compressor piping stubs (at points where cut, Step 6); rewire compressor and leak test.
12. Replace fan orifice/control ring; connect compressor wires after feeding them thru control ring; replace fan/grille assembly and rewire; connect high- and low-voltage power wiring; and replace louvered casing.
13. Replace top cover by running 4 screws into orifice loosely (2 on each side of unit) and tighten when cover is in place. Replace remaining screws.
14. Evacuate and recharge system.

Filter Drier — Install field-supplied filter drier (Table 3) in system liquid line when refrigerant system is opened for service as described under Compressor Removal. Position drier in liquid line at convenient location.

Pumpdown Procedure — The system may be pumped down in order to make repairs on low side without losing complete refrigerant charge.

1. Attach pressure gage to suction service valve gage port.
2. Frontseat the liquid line valve.

3. Start unit and run until suction pressure reaches 5 psig (see Caution).
4. Shut unit off and frontseat suction valve.
5. Vent remaining pressure to atmosphere.

CAUTION: 38QF unit coils will hold only factory-supplied amount of refrigerant. Additional refrigerant may cause units to relieve pressure thru internal pressure relief valve (indicated by a sudden rise of suction pressure) before suction pressure reaches 5 psig. If this occurs, shut off unit immediately; frontseat suction valve and vent remaining pressure to atmosphere.

Unit Controls and Safety Devices

HIGH-PRESSURE RELIEF VALVE is located in compressor. Relief valve opens at a pressure differential of approximately 500 psig between suction (low side) and discharge (high side) to allow pressure equalization.

INTERNAL CURRENT AND TEMPERATURE SENSITIVE OVERLOAD resets automatically when internal compressor motor temperature drops to a safe level (overloads may require up to 45 minutes to reset). When an internal overload is suspected of being open, check by using an ohmmeter or continuity tester. If necessary, refer to Carrier Standard Service Techniques Manual, Chapter 2, for complete instructions.

LIQUID LINE LOW-PRESSURE SWITCH (LLPS) is connected in liquid line to work with compressor internal thermostat in providing loss-of-charge protection during the heating cycle. Control is mounted on liquid line.

With a high-side leak, pressure gradually decreases until low-pressure control stops the compressor. (Low-pressure control settings are shown in Table 8.)

→ **Table 8 — Pressure Switch Settings**

UNIT 38QF	LIQUID LINE LOW-PRESSURE SWITCH	
	Cut-in	Cutout
018 024 030 036 042 048 060	22 ±5 psig	7 ±3 psig

With a low-side leak there is always some pressure in the liquid line. However, compressor motor temperature increases because of insufficient suction gas cooling. This causes internal thermostat to actuate and stop compressor. When compressor stops, system pressure equalizes and contacts on pressure control open. The compressor cannot restart until leak is repaired and system recharged.

CRANKCASE HEATER is connected across line side of contactor and operates continuously.

The purpose of the heater is to keep the crankcase warm during the off cycle and thus prevent dilution of the oil with refrigerant. This assures good lubrication and prevents loss of oil from crankcase during start-up.

To energize crankcase heater, turn thermostat to OFF position and close electrical disconnect to heat pump.

If the electrical disconnect switch to the outside unit has been off for an extended period of time, the crankcase heater should be energized for 24 hours before starting the compressor.

DEFROST CONTROL, consisting of defrost control board and defrost thermostat, interrupts normal system heating operation every 90 minutes to defrost outdoor coil, *if the coil saturated suction temperature indicates freezing temperatures.* Defrost control simultaneously stops outdoor fan, energizes reversing valve solenoid to return system to cooling cycle (outdoor unit as condenser, indoor unit as evaporator), and activates accessory electric heater.

For the heat pump to defrost, 2 conditions are necessary:

1. Defrost timer contacts must be closed.
2. Refrigerant temperature from outdoor unit must be cold enough to cause defrost thermostat contacts to close. Contacts close at 31 ±4 F.

Every 90 minutes of elapsed running time, the defrost timer contacts close for 10 seconds. If the defrost thermostat contacts are closed, the unit defrosts. The defrost timer limits defrosting period to 10 minutes. Normally, the frost is removed and the defrost thermostat contacts open to terminate defrosting before 10 minutes have elapsed. Defrost thermostat contacts open at 80 ±6 F liquid refrigerant temperature. When defrosting is terminated, the outdoor fan motor is energized and reversing valve solenoid is de-energized, returning unit to heating cycle.

HEAT PUMP CIRCUITS shown in Fig. 6 are refrigerant flow diagrams for heating and cooling cycles.

AccuRater™ (Bypass Type) Servicing — See Fig. 22 for bypass type AccuRater components. The piston has a refrigerant metering hole thru it. The retainer forms a stop for the piston in the refrigerant bypass mode, and a sealing surface for liquid line flare connection. To check, clean or replace piston:

1. Shut off power to unit.
2. Pump unit down using Pumpdown Procedure described previously.
3. Remove liquid line flare connection from AccuRater.
4. Pull retainer out of body, being careful not to scratch flare sealing surface. If retainer does not pull out easily, carefully use Vise Grip pliers to remove retainer.

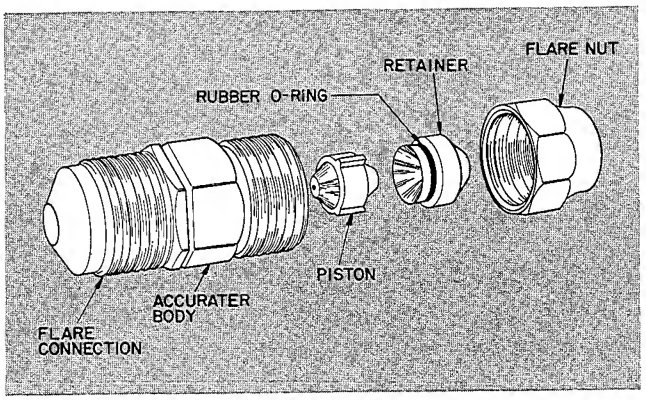


Fig. 22 — AccuRater™ (Bypass Type) Components

5. Slide piston out by inserting a small soft wire, with small kinks, thru metering hole. Ensure metering hole, sealing surface around piston cones and fluted portion of piston are not damaged.
6. Clean piston refrigerant metering hole.
7. Replace retainer O-ring before reassembling bypass type AccuRater. Carrier O-ring part no. is 99CC501052.

LIQUID LINE STRAINER (protects AccuRater) made of wire mesh is located in the liquid line inside 38QF unit behind liquid line service valve. Liquid line is belled and sweat connected where strainer is located. If strainer is plugged, unsweat belled liquid line connection and replace strainer. See Fig. 21.

Compatible Fitting Repair

LEAKING MECHANICAL CONNECTION — Frontseat outdoor section service valves after relieving refrigerant pressure in system. Back locknut off Carrier Compatible Fitting onto tube. Cut fitting between threads and O-ring shown in Fig. 23. Remove tubing section remaining in threaded portion of fitting. Discard locknut.

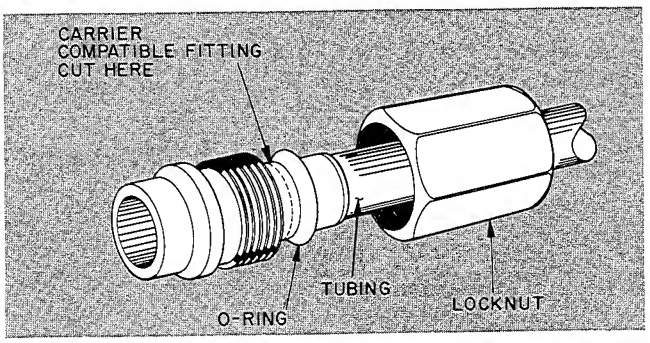


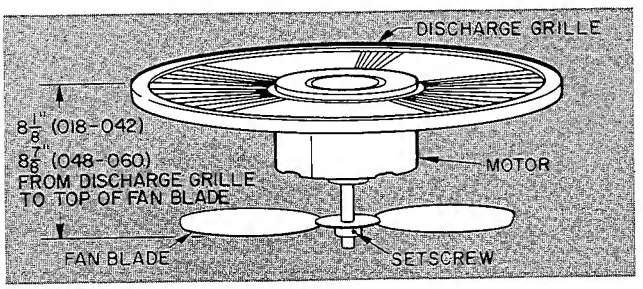
Fig. 23 — Carrier Compatible Fitting

Clean, flux, and insert new tube end into remaining portion of Carrier Compatible Fitting. *Wrap valve base in wet rag.* Heat and apply low-temperature solder (430 F).

LEAKING SWEAT CONNECTION — Frontseat service valves and relieve refrigerant pressure in tubing. Clean and flux area around leak and apply low-temperature solder (430 F).

Condenser Fan Motor Removal

1. *Shut off power to unit. Failure to do so may result in electric shock or injury from rotating fan blade.*
2. Remove top cover as described on page 2.
3. Disconnect fan motor leads from controls.
4. Remove 6 screws holding fan motor/discharge grille in place and lift assembly from unit.
5. Remove Carrier nameplate by straightening tabs.
6. Remove 4 nuts holding fan motor to discharge grille. Remove motor and leads.
7. Reverse procedure for reassembly. Before replacing metal fan, be sure rain shield is in place on motor shaft. Seal with Permagum sealer around hub to prevent entry of water between hub and shaft. Make sure fan is positioned correctly as shown in Fig. 24.



→ **Fig. 24 — Outdoor Fan Position**

MAINTENANCE

CAUTION: Before performing recommended maintenance, be sure unit main power switch is turned off. Failure to do so may result in electric shock or injury from rotating fan blade.

Lubrication

FAN MOTOR BEARINGS — Oiling holes are provided at each end of condenser fan motor. Remove fan motor and lubricate motor with 32 drops (16 drops per hole) of SAE-10 nondetergent oil at intervals described below.

a. Annually, when environment is very dirty, ambient temperature is higher than 105 F, and average unit operating time exceeds 15 hours a day.
b. Every 3 years when environment is reasonably clean, ambient temperature is less than 105 F and unit operating time averages 8 to 15 hours a day.
c. Every 5 years when environment is clean, ambient temperature is less than 105 F and unit operating time averages less than 8 hours a day.

COIL REPAIR — A flare-union coupling is used for E-coil repair. A kit is available, with instructions, thru Carrier Service Parts.

COMPRESSOR contains factory oil charge. If oil requires replenishment, see Table 7 for oil recharge and Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants, page 1-21, for instructions. Use Carrier PP33-1, Texaco WFI-32 or Suniso 3GS oil.

Coil Cleaning to be done at the beginning of each cooling season or more often if required.

CAUTION: Fin damage or removal can result in higher operating costs or compressor damage. Do not use flame, high-pressure water, steam or volatile or corrosive cleaners on fins and tubing. Follow these instructions carefully. Contact your dealer if you encounter problems.

1. Shut off power to unit.
2. Remove louvered casing by taking out 16 screws securing it to the cabinet and sliding it away from the coil.
3. Clean coil using vacuum cleaner and its crevice tool (see Fig. 25). Work crevice tool *vertically* making sure tool only touches dirt on fins. To prevent fin removal, do not "scrub" fins with tool or move tool horizontally.

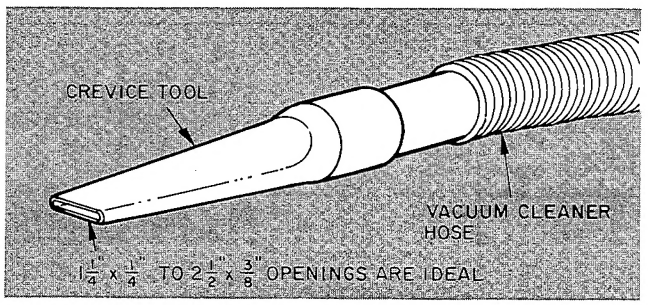


Fig. 25 — Crevice Cleaning Tool

4. If oil deposits are present, spray coil with household detergent (Fantastic, Lestoil, 409, or any similar type). Wait 10 minutes then proceed to step 5.
5. Using garden hose, spray coil vertically downward with a constant stream of water at moderate pressure (see Fig. 26). Keep nozzle at a 15 to 20 degree angle, about 3 in. from coil face and 18 in. from tube. Spray so debris is washed out and away from coil.
6. Reinstall louvered casing being careful not to damage coil.
7. Restore power to unit.

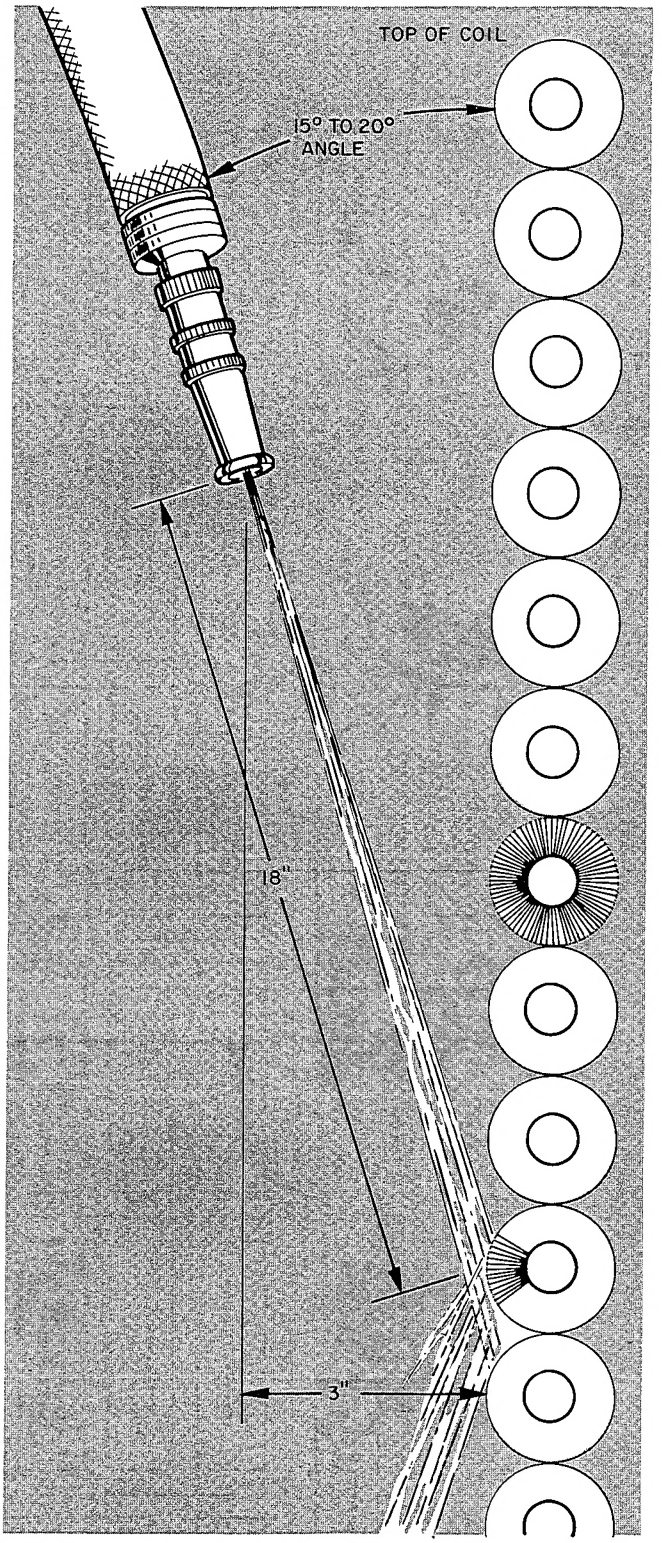
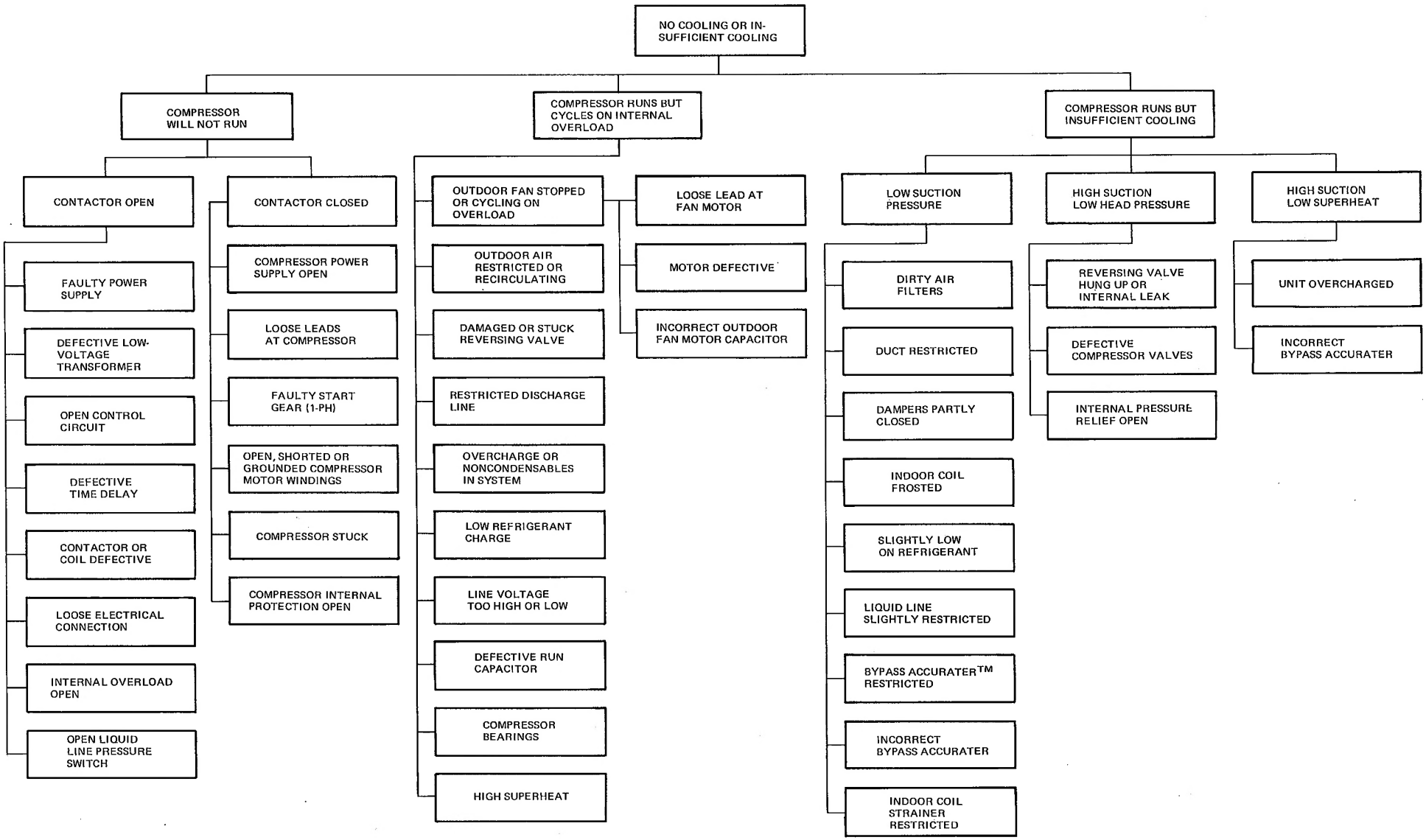
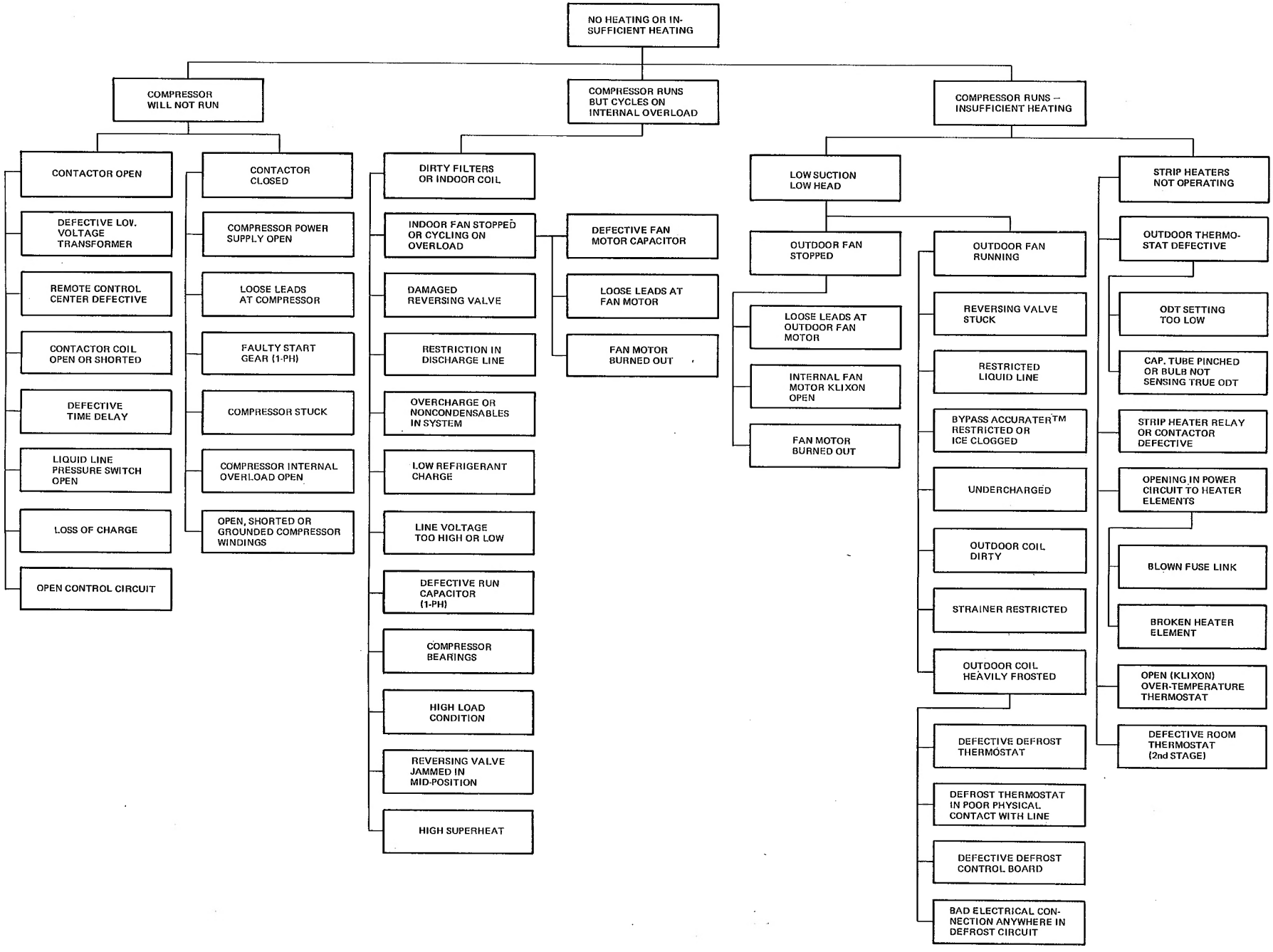


Fig. 26 — Positioning Hose to Spray Coil

TROUBLESHOOTING CHART — COOLING CYCLE



TROUBLESHOOTING CHART — HEATING CYCLE



For replacement items use Carrier Specified Parts.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Book	1	4
Tab	5a	5a

Form 38QF-2SI Supersedes 38QF-1SIM Printed in U.S.A. 4-83 PC101 Catalog No. 563-816